# UNIVERSITY DINING DECISIONS: DO COLLEGE STUDENTS MAKE RATIONAL DECISIONS IN THE MARKET FOR MEAL PLANS?

An Undergraduate Research Scholars Thesis

by

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# ABSTRACT

University Dining Decisions: Do College Students Make Rational Decisions in the Market for Meal Plans? (May 2013)

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When students come to college they take on many responsibilities their parents used to cover for them, including making significant purchase decisions. My research examines the dining plan purchases of students at Texas A&M over time to determine whether these students make rational, utility optimizing decisions. I look to see if students change their purchase behavior after becoming familiar with the system, and after evaluating their prior purchase decisions. Also, I examine whether students alter their purchase decision based on where they live in a given semester. This study finds that students do, indeed, make decisions that allow them to optimize in the future. This is an important question in that it examines whether students naturally possess the ability to make wise, rational decisions, whether they develop this ability during college, or whether they enter and leave college unprepared to make such decisions. If students are unable to optimize, perhaps some sort of standard decision-making curriculum should be added to the core curriculum at universities to better prepare students for life after college. The potential positive externality this could create would benefit society in the long run.

# CHAPTER I

# INTRODUCTION

Consumers are often faced with a set of contract options when purchasing a service they will make use of over a period of time. They may have the option for a shorter-term contract that allows them to see how they like the service, or there might be an incentive, such as reduced prices or other rewards, offered for agreeing to a longer contract. Even for contracts covering the same time period, the volume of the service offered during that period may differ. These types of options are encountered when consumers purchase things like cell phone plans, gym memberships, or newspaper subscriptions. Consumers in each of these markets are given a set of alternative contract options from which to choose, and common knowledge would assume that people behave rationally by purchasing the plan that maximizes their utility. Someone who does not spend much time on the phone has no need for an enormous amount of minutes each month, so there is a plan that meets that type of consumer's needs. Similarly, a businessman who routinely spends hours on the phone each day requires a much larger phone plan. This simple illustration demonstrates that there is a need for consumers to have a somewhat comprehensive set of contract options.

## Previous literature

While it is easy to assume people are generally good at forecasting their needs with such a contract, prior research has found that consumers often misjudge what size plan they should purchase in these situations. In their paper, "Paying Not to go to the Gym," Stefano DellaVigna

and Ulrike Malmendier illustrate consumer overconfidence when purchasing gym memberships. They show that people overestimate how often they will visit the gym, tending to buy year-long memberships rather than paying per trip. They find that on average, people buying the yearly membership show up to workout less than five times per month, costing themselves significantly more than they would if they simply paid per visit. This observed behavior contradicts the idea that consumers behave rationally to maximize their utility. (DellaVigna & Malmendier)

In similar research, Michael Grubb of MIT looks at consumer overconfidence and inattention his work on three-part tariffs. He explains a three-part tariff as consisting of "a fixed fee, an included allowance of units for which the marginal price is zero, and a positive marginal price for additional usage beyond the allowance." (Grubb) According to Grubb, consumers are often inattentive to their usage and end up paying an additional fee as a result of having to add a supplementary allowance of units. He identifies several markets in which such a system exists, including the cell phone service market, internet service, car rentals, and other rental markets that charge some flat rate plus a marginal rate that accrues as the consumer uses the service. According to Grubb, the two factors that allow this three-tariff pricing structure to work are "forecasting overconfidence" and "projection bias." The former is essentially when consumers are overconfident that they are selecting the appropriate allowance of units they will need. Projection bias describes the situation in which "consumers expect to pay a low average price per unit, but sellers profit ex post when consumers make large revisions in either direction." (Grubb) In other words, when consumers realize they either bought too many or too few units of allowance, they miscalculated their actual need and end up paying more than they intended.

In a more general context, Ran Spiegler explains how "rationality is narrowly practiced" when consumers are purchasing a service. He explains why this is the case using the concept of bounded rationality:

> "When some agents have limited understanding of their market environment (including their own behavior in certain circumstances), limited ability to process information, and preferences that are highly unstable, context-dependent, and malleable, market outcomes may differ in interesting and economically significant ways from the rational-consumer benchmark." (Spiegler)

He explains that firms will always behave rationally because they have an important interest in focusing on the market in which they compete, but consumers do not always behave rationally because they "devote a fraction of their attention and intelligence to any individual market." (Spiegler) He further notes that "consumers' bounded rationality can generate market failure, but it is far from clear whether it is a failure that can be fixed." (Spiegler) This is an interesting point as it suggests that there may be some level of perpetual market failure due to consumers' inability to overcome their bounded rationality.

**Purpose and research question**

In this paper, I look to determine if this pattern of consumer overconfidence and inattention can be traced to the period when people experience their earliest independent decision-making opportunities. Specifically, I observe a particular segment of the population, college students, to see if they behave in a rational manner or if they exhibit flawed decision-making practices from the beginning. When people enter college, they take on decision-making responsibilities that they might not have had before. In many cases they are forced to make decisions that were

previously made for them by their parents. Because freshmen entering college tend to have less significant decision making experience, the question of how well they will adapt to this new obligation persists and merits examination. Perhaps if it can be determined that people begin making irrational purchase decisions at this stage of life, when they first begin making them on their own, something can be done to counter this pattern. Some form of practical rational decision-making curriculum could be added to the core curriculum for college freshmen to proactively address this behavior and correct it over time. Roberta Woolever suggests this type of approach in her work, "Teaching Rational Decision-Making." Such curriculum could lead people to make better decisions down the road and, perhaps, it could correct for the bounded rationality problem noted by Spiegler. With better decision-making early on, this could prove to have a positive externality on society as a whole as people make decisions that make more efficient use of resources in general.

To observe the decision-making patterns of college students, I look at one of the first decisions a freshman must make upon entering college: whether to buy a dining plan, and, if so, what size plan to purchase. The first-time buyer has limited knowledge to base his decision on and has no personal experience with the university's dining system. As such, it is not surprising that first-semester freshmen often purchase a meal plan option that does not best meet their needs, as they either buy one that is too small, or, more likely, overestimate their need for on-campus meals.

One consideration that should not be overlooked is that many students pay for college and its associated costs with the help of their parents. This could raise some objections as to whether the student is the one choosing the meal plan or if it is actually the parents. Regardless of

whether the student's parents are helping pay for school, the student is the one on campus using the actual meal plan. While his parents may help him choose his initial plan, as he gains experience with the system he is in a position to inform his parents of what size plan he actually needs. Thus, the source of a student's funding for school should not change the fact that he ultimately uses firsthand experience and information to choose the plan he believes to be best suited for his needs.

The primary question I look to answer here is whether college students adjust their purchase behavior in a rational way such that they optimize their dining plans based on their needs. A rational decision-maker should take note of his prior purchase decision and adjust based on the knowledge and experience he has gained and based on an increased familiarity with how the system works. I will look to see if students continue to overestimate (or underestimate) the size meal plan they need as they progress through college. The optimal decision maker would alter his behavior each semester until he found the plan that best suited his dining needs, and then he would continue to purchase that plan each semester, all else being equal. In this study, I hypothesize that the longer a student participates in the University Dining system, the closer he will come to optimizing his meal plan purchases, demonstrating an ability to make rational, utility optimizing decisions based on increased knowledge and experience. My research examines trends in meal plan purchases at Texas A&M University over a period of seven semesters, Fall 2008-Fall 2011, to determine if students are rational decision-makers who adjust their meal plan purchases to best meet their needs.

# CHAPTER II

# METHODS

## Data collection

Data was collected from the Department of Dining Services at Texas A&M University. I contacted the Executive Director of Dining Services, Mr. David Riddle, and scheduled a meeting to discuss specifics about the data I needed. He forwarded my request to the Dining Services Accounting Department and put me in contact with them. They asked me to submit an open records request through the Department of Open Records who then got the information from Dining Services and sent it to me. After reviewing the data they provided, I realized I needed a few more pieces of information to make it useful for this project, so I worked with representatives of both the Open Records Department and the Accounting Department for Dining Services to complete the data collection process. The data comprises historical records kept by Dining Services and is available to anyone who submits an open records request. It ranges from the Fall 2008 semester through Fall 2011. Contained in the data are multiple breakdowns of meal plan purchases and other related information for the relevant time period.

## Texas A&M meal plan background

At Texas A&M during the period being studied, dining plans consisted of a combination of "meals" and "dining dollars." Using one meal allowed the student to either purchase a "Maroon Plate Special" which was a specified combination of entrée, side item, and drink, or to eat at the all-you-can-eat dining hall on the North side of campus. Dining dollars can be used for the same purposes, but they are spent in the same fashion as cash and thus allow for more versatile meal

combination purchases. To make this study meaningful, it was necessary to get complete dining plans into common terms, so I converted all "meals" into dining dollars and came up with a total meal plan value that was expressed solely in dining dollars. I looked at the total price of each meal plan and subtracted the number of dining dollars to determine how much value the meals in the plan had. I then divided this dollar amount by the number of meals to find the dollar amount per meal. At Texas A&M, students get 10% off when they use dining dollars rather than real dollars, so $1 dining dollar equals $1.10 real dollars. I used this conversion to get the value per meal from real dollars to dining dollars. I then added the number of original dining dollars in a plan to the number of dining dollars converted from meals to find the total value of each meal plan expressed in terms of dining dollars. With all dining plans exclusively in terms of dining dollars, I ranked the plans according to their total values and coded them such that the highest-valued plan was labeled "Plan 1," the next "Plan 2," etc. in order from highest to lowest value. Because the meal plan options changed somewhat between 2008 and 2011, a few options were not available in both semesters analyzed, in which case that code number was skipped in the given semester where appropriate. Also, some plans, although not exact, were roughly the same value in each year and were thus considered to be the same plan number.

Just as the dining plans were converted into like terms, students' remaining balances were converted following the same formula such that they were entirely represented as dining dollars. With this information streamlined, we have several variables for each student, including what plan number they purchased, the value of that plan, their remaining balance at the end of the semester, and their place of residence, all for both years studied. This allows for comparisons

between students' freshman and senior years that offer insight into the central question being investigated.

One noteworthy aspect of the Texas A&M dining plan system worth noting at this point is that at the end of the Fall semester, a student is allowed to carry over $100 dining dollars from their Fall balance if they purchase a plan for the following Spring semester. The same number of dining dollars can be rolled over after the Spring semester, but they may only be applied to a summer dining plan which most students are not around to purchase. Therefore, it is not a common occurrence for any dining dollars remaining at the end of a Spring semester to be retained for further use. In any semester, any dining dollars in excess of the allowed $100 rollover amount are automatically lost.

**Data analysis**

Using Stata statistical software, I uploaded the data for Fall 2008 and Fall 2011 and merged them such that any matches between the two semesters based on students' UINs would be detected. Doing so allowed me to identify those students who purchased a meal plan in both semesters and to remove those who did not from the sample. This step was necessary to examine whether students changed plans. It weeded out those who would have been included in 2008 but graduated before Fall 2011 and those who were at A&M in 2011 but not in 2008. Essentially, in selecting these as the start and end dates for examination, I have narrowed my sample to only those students who were freshmen in 2008 and seniors in 2011 and who purchased meal plans in both years. These are the students we are most interested in looking at as they have remained in

the system throughout their time at school and have the most experience with how the dining system operates.

While data exists for the semesters in between Fall 2008 and Fall 2011, Dining Services did not record it in a consistent format, and in some cases, certain important pieces of information are not included. Without having complete data for every semester between the two I used, examining those semesters would not prove to be fruitful. I chose to use Fall 2008 and Fall 2011 so I could examine the same set of students as freshmen and as seniors, giving them the maximum amount of time to gain familiarity with the system. Further research could be conducted to determine how a student adapts his meal plan purchase each semester and to see how long it takes to make the rational switch. In this paper, however, we simply seek to determine whether students developed rational decision-making skills by the time they graduated and to compare their skills at that point to when they first entered college. We should either find that they came in already prepared to make such decisions, that they learned to make good decisions while in school, or that they leave school just as ignorant in rational purchase behavior as they were when they started.

After narrowing the sample to only those who purchased meal plans in both Fall 2008 and Fall 2011, I next removed any student who was a member of the Corps of Cadets in either year. In the dataset, each student's residence is listed as part of their plan, so it was relatively simple to take out anyone whose residence was recorded as "Corps." The purpose of removing members of the Corps was to eliminate the bias that would be introduced by their presence in the sample. Members of the Corps are required to purchase a particular meal plan every semester and thus

they would not have the option to change plans. Furthermore, because all Corps members live on campus all four years and eat in the Corps dining hall at scheduled times, they would tend to use up most of their plans which are designed to meet their dining needs specifically. Including members of the Corps, for the reasons outlined above, would necessarily create bias that is easily avoided by simply taking them out of the sample. The final sample size of students who purchased a meal plan in both semesters observed and who were not members of the Corps of Cadets was 723 students.

In adjusting for inflation, all dollar amounts are expressed in terms of 2008 dollars throughout the study. To accomplish this, I found the annual average CPI for both 2008 and 2011 from the Bureau of Labor Statistics website. The CPI in 2008 was 215.303 and the CPI in 2011 was 224.939. (Bureau of Labor Statistics) I then used these numbers to convert all dollars into 2008 dollars using the following formula:

**Equation 1:**

$$\$_{2008} = \frac{\$_{2011} \times CPI_{2008}}{CPI_{2011}}$$

To explore the question of interest, I used Stata to observe the mean remaining dining dollar balance in each semester and made a comparison. I further looked at how many people changed to a smaller plan, larger plan, or kept the same size plan in 2011. The remaining dining dollar balances were then observed for each of these groups to examine whether changing plans had any effect on how much of his or her plan a student used. Also, the mean remaining dining

dollar balance was broken down based on which plan a student bought and based on where the student lived each year.

Each individual meal plan purchaser was placed into a specific category based on the size of the plan he or she bought. In considering whether the person bought the "correct" meal plan, we would say that he ideally spends the full amount of the meal plan and that it satisfies his dining needs for the semester exactly. By satisfying his needs, he has not spent more than he would have just to use up his remaining balance, and he has not stopped eating because he ran out of dining dollars. A student chose the ideal plan if he spent his last dollar on the last meal he needed to eat in that given semester. No data exists to determine when the last dining dollar was spent or what it was spent on, so we are unable to conclude with complete confidence whether a student fit this ideal purchase description. We can say, however, that a student with a remaining balance less than $100 dining dollars very likely made the purchase decision that best met his or her needs. The $100 threshold is used because that is the amount students are able to carry over to the next semester. This means that if they had a positive remaining balance but it was $100 or less, students did not lose any money. Because it is unlikely that anyone made an ideal purchase, we look at the difference between the amount of one's meal plan and the amount that person actually spent in the observed semesters. The mean of the remaining dining dollar balances in each year was determined and used to examine the extent to which people chose the right or wrong plan. To explore whether students' place of residence has an effect on students' meal plan purchase decisions, we examine these same relationships for each individual residence option.

Meal plan options are labeled Plans 1-9 based on their respective values, with Plan 1 being the plan highest in value and Plan 9 being the smallest. Dining Services altered the size of some of the plans and had slightly different options available in the two years observed. Plans that were either exactly the same or very close in value were considered to be the same plan option in both years. In 2011, a plan was offered that was larger than value than any in 2008, so it is labeled Plan 1, and there is no corresponding plan for 2008. Similarly, Plans 3, 6, and 9 from 2008 did not have counterparts in 2011, so that plan number was simply skipped for 2011. In both years, students had the option to choose Plans 2, 4, 6, 7, and 8.

Students' places of residence were broken down into three categories referred to as Northside dorms, Southside dorms, and off campus. The two dorm categories make up the students who lived on campus in a given year. These categories were used throughout the study to examine the relationship between where a student lives and his dining decisions.

In addition to comparing means and observing whether students switched plans and residencies over time, I conducted an ordinary least squares regression with the size plan students bought in 2011 serving as the dependent variable. The independent variables were students' remaining dining dollar balances in 2008 and their place of residence in 2011. The regression equation using ordinary least squares is as follows:

**Equation 2:**

$$PlanAmt2011 = \beta_0 + \beta_1 (Remaining\ Balance\ 2008) + \beta_2 (Residence\ 2011) + u_i$$

My null hypothesis, $H_0$: $\beta_1 = \beta_2 = 0$, states that a student's remaining dining dollar balance in 2008 and his place of residence in 2011 have no effect on the size meal plan he purchases in 2011. The alternative hypothesis, $H_A$: $\beta_1 < 0$ and $\beta_2 \neq 0$, says that remaining balance in 2008 is negatively correlated with the size plan purchased in 2011, and that the place of residence does have an effect on plan size in 2011.

# CHAPTER III

# RESULTS

The following tables provide a look at various comparisons between meal plan purchases for non-Corps students who purchased a meal plan in both the Fall 2008 and Fall 2011 semesters.

**Table 1: Comparison of Students' Plan Choice in Each Year and Mean Remaining Balance**

| 2008 Plan | Smaller | Same | Larger | Remaining Balance 2008 | Remaining Balance 2011 (If Smaller) | Remaining Balance 2011 (If Same) | Remaining Balance 2011 (If Larger) |
|---|---|---|---|---|---|---|---|
| 2 | 96 | 8 | 0 | $255.95 | $98.62* | $132.92* | - |
| 3 | 13 | - | 0 | $73.54 | $76.93 | - | - |
| 4 | 196 | 30 | 4 | $143.21 | $67.73* | $58.34 | $ 130.48 |
| 5 | 11 | 0 | 0 | $128.53 | $152.11 | - | - |
| 6 | 193 | - | 30 | $116.17 | $73.15* | - | $74.90 |
| 7 | 42 | 10 | 2 | $78.69 | $68.91 | $46.88 | $3.55 |
| 8 | 0 | 38 | 10 | $55.04 | - | $35.57 | $127.87 |

*Indicates that the value is statistically significant in difference from RemBal08 at the 95% confidence level

Did not include Plan 9 because the only possibility was to switch to a larger plan in 2011 since no Plan 9 was offered in 2011 and there was no plan smaller than Plan 9.

All dollar amounts are expressed in 2008 dollars to adjust for inflation.

Table 1 shows the number of students who either switched to a smaller plan, kept the same plan in both years, or switched to a larger plan in 2011 based on the plan that student purchased in 2008. Plan 1 is not included because it was not a purchase option in 2008. Plan 9 is also excluded because the only option for a student who bought Plan 9 in 2008 was to change to a larger plan in 2011 since Plan 9 did not exist in 2011 and there was no smaller option. Plans 3 and 6 were also not available in 2011, so a student purchasing either of those plans in 2008 had to either buy a smaller or larger plan in 2011.

With the exception of Plan 8, the majority of students purchased a smaller plan in 2011 relative to the plan they had in 2008. In the case of Plan 8, it was impossible to switch to a smaller plan because that was the smallest offered in 2011. For each plan, relatively few students chose to switch to a larger plan in 2011. In addition to the number of students switching plans, Table 1 provides information on the mean remaining balance for each case. In the table, an asterisk indicates that the difference between the remaining balance in 2008 and the respective balance in 2011 was statistically significant at the 95% confidence level. In each case, the mean remaining balance was lower in 2011.

**Table 2: Mean Remaining Dining Dollar Balance by Place of Residence**

| | Mean Remaining Balance | | Number of People | |
|---|---|---|---|---|
| **Residence** | **2008** | **2011** | **2008** | **2011** |
| Overall | $133.46 | $77.21 | 723 | 723 |
| Northside Dorm | $148.57 | $60.30 | 308 | 145 |
| Southside Dorm | $123.42 | $41.57 | 279 | 39 |
| Off Campus | $119.86 | $84.33 | 136 | 539 |

*All dollar amounts are expressed in 2008 dollars to adjust for inflation.

Table 2 shows that, overall, in 2008 students had an average of $133.46 dining dollars remaining on their meal plans. The same students in 2011 had a mean of $77.21 dining dollars remaining at the end of the semester. This difference of $56.25 is statistically significant at the 99% confidence level as it has a t-value of 8.4625.

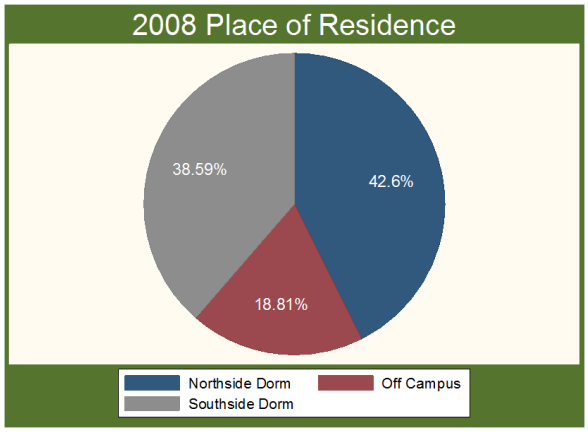


**Figure 1a: Distribution of Students in Residence Categories 2008**

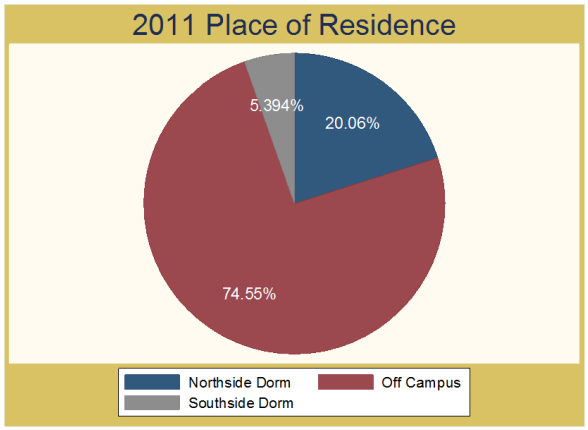


**Figure 1b: Distribution of Students in Residence Categories 2011**

Table 2 further provides a look at the breakdown of students' remaining balances in each year based on where they lived. Students' residences fall into one of three categories: Northside dorms, Southside dorms, or off campus. Figure 1a shows the percentage of students living in each in 2008, and Figure 1b shows the same for 2011. These two figures demonstrate that the vast majority of students live on campus in dorms as freshmen. By the time they become

seniors, as Figure 1b illustrates, the majority of students have moved off campus. Table 2 shows that for all three categories of residence, students had smaller remaining balances in 2011.

**Table 3: Residence Same or Different in 2008 and 2011**

| | Mean Remaining Balance | | | | |
|---|---|---|---|---|---|
| **Residence** | **2008** | **2011** | **Number of People** | **t-value** | **Statistically Significant (99% Confidence Level)** |
| Northside 2008, Not 2011 | $150.39 | $82.21 | 213 | 5.6574 | Yes |
| Northside Both | $144.48 | $53.01 | 95 | 5.1963 | Yes |
| Southside 2008, Not 2011 | $123.54 | $84.80 | 257 | 3.5433 | Yes |
| Southside Both | $122.04 | $43.72 | 22 | 2.8649 | Yes |
| Off Campus 2008, Not 2011 | $69.76 | $48.72 | 12 | 0.6595 | No |
| Off Campus Both | $124.70 | $80.10 | 124 | 2.4318 | Yes |

Table 3 presents information on students based on whether they lived in the same place in both years or moved to a different residence category in 2011. Consistent with Figures 1a and 1b, the table shows that most students who lived on campus in 2008 did not stay there in 2011. Alternatively, most students who lived off campus remained there in 2011. Students who lived on Northside or Southside in 2008 and moved in 2011 had lower remaining balances in 2011 by an average of $68.18 and $38.74 dining dollars respectively. Students who lived on Northside, Southside, or off campus both years saw their mean remaining dining dollar balances reduced by $91.47, $78.32, and $44.60 respectively. Each of these differences was determined to be statistically significant at the 99% confidence level after evaluating their respective t-values.

Very few people moved from off campus to an on-campus dorm in 2011, thus the difference in their remaining balances was not found to be statistically significant.

**Table 4: Comparing Plan Size in 2008 to Plan Size in 2011**

| Plan size in 2011 compared to 2008 | Number of People | % of Sample | Mean Balance in 2008 | Mean Balance in 2011 |
|---|---|---|---|---|
| Smaller | 551 | 76.2% | $150.50 | $77.00 |
| Same | 86 | 11.9% | $90.45 | $53.88 |
| Larger | 86 | 11.9% | $67.34 | $101.83 |

Table 4 presents data comparing plan sizes between 2008 and 2011. The table shows that 551 students, or 76% of the sample, switched to a smaller plan in 2011. These students, on average, had $73.50 fewer dining dollars remaining in 2011 compared to what they had in 2008, a difference that is statistically significant at the 99% confidence level with a t-value of 9.7116. A similar pattern follows for the 86 students who kept the same plan in both years, as they saw a decrease in their mean remaining dining dollar balance of $36.57. With a t-value of 2.4747, this difference is statistically significant at the 95% confidence level. Those who switched to a larger plan in 2011 saw their remaining dining dollar balance increase by an average of $34.49. This mean difference, however, is not statistically significant at the 95% confidence level.

Students who purchased smaller meal plans in 2011 significantly reduced the size plan they bought relative to their 2008 purchases. If a student bought a smaller plan in 2011, the mean size of his or her plan was $1178 dining dollars in 2008 compared with just $662 in 2011 for a difference of $516. As illustrated, these students nearly cut the value of their meal plan in half. This difference is statistically significant at the 99% confidence level with a t-value of 48.4136. In looking at the sample as a whole, students' plans were, on average, $364.22 smaller in 2011.

As mentioned, students may carry up to $100 dining dollars from one semester to the next, so we are interested in examining the numbers for students who had more than $100 remaining in 2008 since these students actually lost money. Of students who had more than $100 dining dollars remaining in 2008, 86% switched to a smaller plan, 7% kept the same plan, and 7% switched to a larger plan in 2011.


**Figure 2a: Variance of Dining Dollar Amount Spent by Plan Size 2008**

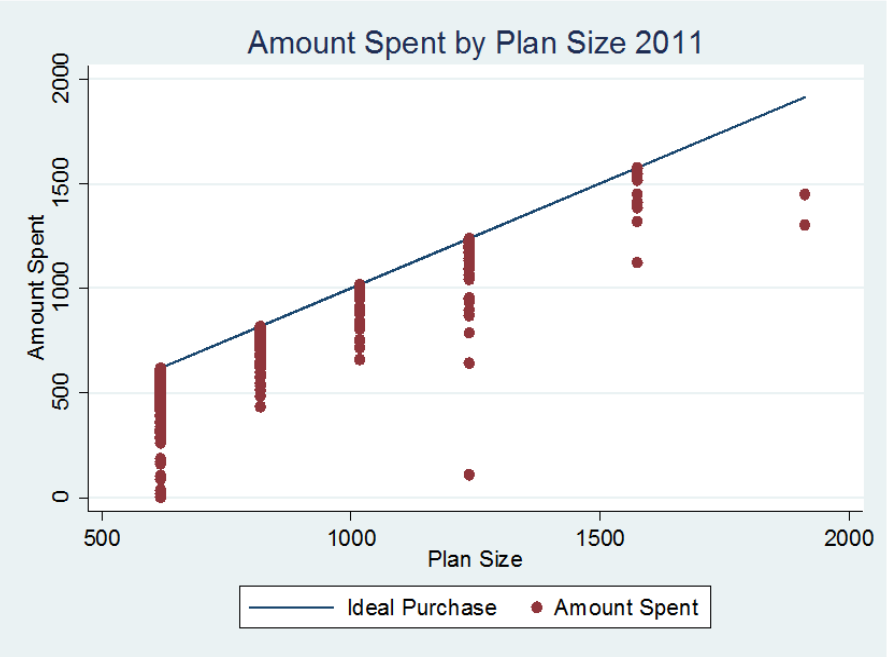


**Figure 2b: Variance of Dining Dollar Amount Spent by Plan Size 2011**

Figures 2a and 2b show the variance of the amount of dining dollars students used based on which plan they had in a given year. They illustrate the magnitude of the deviation from the "ideal" purchase given the actual amount of each student's plan he or she spent. The ideal situation is illustrated as a positive linear function, and the actual usage of meal plans is demonstrated by the noise surrounding this line. The further a student is on the graph away from the ideal line, the further his meal plan choice is from best meeting his dining needs. In examining both Figures 2a and 2b, we see that the points are more scattered in 2008 (Fig. 2a) and that they become more tightly bunched in 2011 (Fig. 2b). Also, apart from a few outliers, even those students furthest from the line in 2011 are closer than those furthest from the line in 2008. It can also be noted that a greater number of students are clustered around the smaller plans in 2011, whereas there appears to be more students purchasing the larger plans in 2008.

In looking at the amount of a student's plan spent as a percentage of the full value of the plan, there is an interesting finding. In 2008, students used, on average, 87.9% of their plans, whereas in 2011 they used 88.7% of their plans. This result comes as somewhat surprising as it seems contrary to what the other data tell us. I provide a more detailed look into why this should not necessarily be surprising in the following section.

**Table 5: OLS Regression for Plan Amount in 2011**

| | OLS Regression |
|---|---|
| Remaining Dining Dollar Balance in 2008 ($X_1$) | 0.0981<br>(0.0609) |
| Residence in 2011 | -64.2596*<br>(8.7122) |
| Constant | 921.7294*<br>(33.7932) |
| N | 723 |
| $R^2$ | 0.1204 |
| *p<0.05 | Robust Standard Error in () |

Table 5 presents the results of the OLS regression. In this regression, $\beta_1 = 0.0981$, which is interpreted to mean that a student's remaining dining dollar balance in 2008 does not do much to explain the size of his or her meal plan in 2011. The student's residence in 2011 appears to do more to explain what size plan he or she chose in 2011, as $\beta_2 = -64.2596$. The negative sign indicates that students living off campus purchase smaller plans than students living on campus. This is because on-campus students were coded as 1 or 3 for Northside and Southside, respectively, while off campus was coded as 4. The remaining balance in 2008 was not found to be statistically significant, but the place of residence was statistically significant at the 95% confidence interval. The $R^2$ is 0.1204, which means that only 12.04% of the variation in 2011 meal plan size is explained by the independent variables in this regression. This is fairly low, suggesting that there are likely unobservable factors that affect what size plan a student purchased.

# CHAPTER IV

# CONCLUSIONS

The information presented in the previous section offer mixed results. When comparing mean remaining balances for students in each year, the results suggest that, as hypothesized, students demonstrated an ability to make good, rational purchase decisions in the market for meal plans. Taken as a whole, this sample of Texas A&M students exhibited this ability by recognizing the need to either change or keep the same size meal plan such that they could best meet their dining needs without spending more than was necessary. These students gained experience from their prior meal plan purchases and used this to judge what size plan to buy in future semesters. The majority of students, recognizing that their plans were too large when they were freshmen, switched to smaller plans by the time they were seniors.

When tested using multiple regression analysis, however, it appears that we cannot conclude that students' remaining balances or residencies explained the size meal plan they purchased in 2011 very well. Instead, this regression suggests that these variables may have a small role, but that there are other factors that were not accounted for, potentially because they are unobservable variables.

In considering what other variables might affect a student's meal plan choice, there are several things that come to mind. A student's class schedule may prevent him from having time to buy lunch on campus, or it may cause him to be on campus longer than most students. In the first case, he might choose to buy a smaller plan, and in the latter he may opt for a larger plan. Also,

a student may patronize the on-campus convenience stores more often than other students, causing him to choose a larger plan to satisfy that preference. Perhaps a student was sick for an extended period of time or traveled a lot in a given semester and was therefore unable to use a large portion of his meal plan. Each of these scenarios could have an effect on the size plan the student decides to buy and on the amount of dining dollars he has remaining at the end of a given semester. Unfortunately, based on the available data, these factors are unable to be observed and accounted for in our regression analysis.

Two main factors were tested in this study to determine how much they contribute to the decision to change meal plans. First, a student's remaining balance in an earlier semester gives him a better feel for what he will need in the future. Thus, as was the case for the majority of the students in our sample, if a student has dining dollars remaining at the end of the semester, it might be wise to choose a smaller plan the next time. Students in this study showed that, on average, this was the case as the majority chose a smaller plan as a senior. Furthermore, those who had especially large remaining dining dollar balances switched to smaller plans at an even larger proportion than that of the complete sample. In particular, we noted that 86% of students who had more than $100 dining dollars remaining in 2008 chose a smaller plan in 2011. These students actually lost money in their first meal plan purchase because they were only able to carry over $100 of their total remaining balance. I conclude that the actual loss of money made students more attentive to their next meal plan purchase as students with balances greater than $100 shifted to smaller plans at a very high rate. Perhaps those students who had fewer than $100 dining dollars remaining felt good about their purchases since they were able to roll that

money into the next semester, and that explains why they did not change to smaller plans at quite as high a rate.

The second major factor considered in observing students' decisions to change meal plans is where they lived in a given semester. Figures 1a and 1b illustrate the fact that most freshmen live on campus and most seniors live off campus. Students living on campus are more likely to need larger plans as they are more likely to eat a larger number of their meals at a campus dining facility. Living on campus makes it more difficult to eat at restaurants off campus as students may have to park their cars in parking garages that are not conveniently located. Also, living in a dorm without a kitchen prevents on-campus students from cooking many of their own meals at home, again pointing to the fact that they need to patronize dining facilities located on campus. Similarly, students living off campus likely have a kitchen and easy access to their vehicles which both enable them to eat off campus more easily. As a result, these students likely do not need as much in a meal plan.

With most seniors living off campus, it is rational for them to purchase smaller meal plans, and that is exactly the case in my study. It makes sense for a freshman living on campus to purchase a larger plan in anticipation of eating on campus more often. Likewise, a senior living off campus is likely to eat on campus less frequently, so they tend to buy smaller meal plans.

Regardless of where students live as seniors, data in this study indicate that prior meal plan purchases and the experience gained from them play a role in determining how students purchase and use their meal plans in later semesters. This is made clear by the fact that students had

significantly smaller remaining balances in each residence category in 2011. Students who still lived on campus as seniors displayed the same rational purchase behavior as those living off campus by purchasing plans that allowed them to meet their dining needs while having fewer dining dollars left over at the end of the semester.

Moving off campus did not appear to make a difference for seniors in terms of having smaller remaining balances. In fact, those who stayed on campus in both years reduced their remaining balances by a greater amount. This could be because those who stayed in the same location had fewer changes to take into consideration and had learned by their senior year what size meal plan worked best for them given where they lived.

Figures 2a and 2b illustrate the hypothesized outcome that students learn from experience with the system and that they make better meal plan purchase decisions over time. These figures show that the mean distance from the ideal line was greater for freshman students than for seniors. This demonstrates the idea that the freshmen learned as they moved through college and were able to make more utility-maximizing purchase decisions as seniors.

It is interesting to note the differences in remaining balances between students living on the north side of campus and those on the south. Initially one might think it odd that there would be a discrepancy since they all live in dorms on campus, but there are certain factors to consider that shed light on why this may be. First, the dining facilities located on the north side of campus differ from those on the south side, so this may affect how often a person chooses to patronize campus dining facilities. Also, the ease with which a student can access a facility may play a role, as students on the north side who prefer the food on the south side might not always be

willing to travel across campus to eat and might, therefore, choose not to go to a campus dining facility. In addition, the cost of eating at these differing facilities could have an effect because if it costs more to eat on the north side, someone living there might use up more of his meal plan than someone living on the south side. For off-campus students, there is a different dynamic at play, and convenience is likely a large factor.

In the previous section, I noted that I would address the surprising fact that students used roughly the same percentage of their meal plans in both years. This fact should not be that surprising considering that students averaged smaller plans in 2011. Spending the same percentage of a student's plan is consistent with having a smaller remaining balance in 2011 because if you have a smaller plan and spend the same proportion of it, you will necessarily have a smaller remaining balance. Now that we see how it is possible that students spent almost the same percentage of their plans in each year, the question becomes why, and does this mean they are not being rational? Why students exhibit this spending pattern can never be fully determined as there are many unobservable factors that come into play when a student spends his dining dollars. One possibility is that students hold off on spending their dining dollars early in the semester for fear of running out too quickly. They may choose to spend their dining dollars only on their three main meals of the day and refrain from buying snacks at the convenience store or buying a friend a meal early in the semester. By the time they confirm that they will have enough to make it through the semester, they may not have sufficient time to spend the remaining amount in full, so they end up having close to the same percentage of their plan remaining. This does not make their purchase decision irrational, however, because most students switched to a smaller plan after having a large remaining balance before. Even if they have the exact same percentage of

their plans leftover, they still end up losing less money than before. Making a rational decision does not mean making a perfect decision. It simply means recognizing that changing plans would be the best option and that it would increase the student's utility. Students have still made themselves better off by switching, and thus they have demonstrated good rational decision-making behavior.

One thing to note that could potentially cause bias in this study is that students, recognizing that they lose any dining dollars in excess of the $100, will sometimes attempt to use up the excess amount by spending it at the on-campus convenience store or buying meals for their friends at the end of the semester. This could potentially cause bias as students may appear to have smaller remaining balances than they would if they continued to spend their dining dollars at a constant pace throughout the semester. The extent that this occurs is not known and cannot practically be measured, so some bias may remain. With this in mind, the pattern observed in the study still seems to be conclusive. Even if this behavior was prevalent, it would still follow the idea that older, more experienced students make rational decisions as they use their experience to know to spend their excess dining dollars in this fashion. A younger student who has less experience in the system may not think to "dump" his dining dollars in this way, and it may be that he learns this behavior over time as well.

Overall, this study has shown that students purchasing meal plans at Texas A&M have demonstrated the ability to make rational purchase decisions. While this is a case study looking only at students from one university who are purchasing only one service, it sheds light on the

way college students reason and can therefore be useful in a more general context. Prior studies have already shown us that people are bad at making rational decisions when choosing a contract from a menu of options for a service that lasts a given amount of time. Why, then, do we see better decisions being made by college students who are facing these choices for the first time? This is a question that should be studied further, as I cannot answer it based on this study. I do offer as my hypothesis, though, that perhaps it has to do with the very fact that these people are in college. It is widely known that the cost of a college education is extremely high between tuition, fees, room, and board. I posit that it is because of these enormous costs that students make better purchase decisions while in college. They look for any possible way to reduce the cost of their education, so students are much more likely to be attentive to their purchase history and to make changes that offer them the prospects of saving money. Even if their parents are helping to pay for college, students generally relay information such as their dining plan needs to their parents, and with much of their education being funded by loans in many cases, students have incentive to pay attention to how much they spend on college and do their best to save money wherever they can.

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